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Is the Setting Up Aid Mitigating the Generational Renewal Problem in Farming?

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Abstract
This study is the first to evaluate the setting up aid in the Rural Development Programme. For Sweden we investigate if the aid, firstly, speeds up the transition process to farm management and, secondly, affects income from farming and survival of the farm. The approach builds on a regression discontinuity design and explores an age 40-eligibility requirement in the setting up aid. We find that the setting up aid has a impact on the transition to farm management, as well as it increases income from farming and farm survival. Consequently, the aid is likely to fulfil its aim of attracting young people into farming.

JEL classification: J43, Q12, Q18
Key words: generational renewal; young farmers; Setting up aid; Rural Development Programme; farm management; income from farming

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1. Introduction

The European Commission has flagged for a shortage of young farmers in Europe (Regidor, 2012; Zagata et al., 2017) and agriculture's generational renewal problem is increasing (Matthew, 2018). In Sweden, the share of farmers younger than 35 has decreased from ten per cent to four per cent between 1997 and 2015. At the same time, farmers older than 55 has increased from about 30 per cent to over 60 per cent (see Figure 1). A shortage of young farmers may harm the modernization of the sector because young farmers are more likely to be profit oriented (Gorton et al., 2008; Grubbström et al., 2014; Hamilton et al., 2015) and to consider themselves as entrepreneurs (Gonzales and Benito, 2001; Vesala and Vesala, 2010; McDonald et al., 2014; Stenholm and Hytti, 2014). Also, young farmers seem to have stronger preferences for sustainability (Comer et al., 1999; Vanslembrouck et al., 2002), organic farming (Laepple and Van Rensburg, 2011; Lobley et al., 2009), and animal welfare (Mann, 2005).

The main obstacle hindering young farmers, both successors and new entrants, to become managers of their own farm is the access to land (Regidor, 2012). In the UK, for example, inheritance is regarded the only way to become a farmer (Lobley, 2010; Symes, 1990). Other obstacles are low returns to farming (Nordin and Höjgård, 2019; Nordin et al, 2016), a lack of capital assets, higher off-farm incomes (Ahearn, Johnson, and Strickland, 1985; Ahearn et al., 2006; El-Ostra et al., 2008; Hill and Bradley, 2015), and late succession (Gale, 1994; Regidor, 2012).

As a first measure to tackle the generational renewal problem, EU introduced early retirement schemes at the national level in the 1960s, which the Mac Sharry CAP reform of 1992 later lifted to the EU level (EEC, 1992). Since 1981, EU Member States can choose to grant an aid to young farmers (EEC, 1972) and since 2000 the Rural Development Programme (RDP) includes a Setting up aid (EEC, 1999). In addition, a compulsory Young Farmer Payment was added to the first Pillar in 2015. In 2007-2020, EU has allocated 9.6 billion euro (18.3 billion euro including co-financing from Member States) to the generation renewal project where about 70 per cent of the funding is for the Setting up aid and about 30 per cent is for the Young Farmer Payment (ECA, 2017).

The early retirement schemes has been found unsuccessful in increasing the generational renewal (Mazorra, 2000; Bika, 2007; Ingram and Kriwan, 2011). As to our knowledge, there has not been an empirical impact evaluation of the Setting up aid or the Young Farmer Payment on generational renewal. In a general assessment of these measures, the European Court of Auditors conclude that the policy "is based on a poorly-defined intervention logic, with no expected results and impact specified" (ECA, 2017). Also, case studies of seven Member states find that the subsidies "assists with capitalization and financing of intergenerational succession, but is not sufficient for the establishment of a new farming business" (Zagata et al., 2017).

With detailed individual register data for the full population of farmers in Sweden, merged with subsidy data for the years 1997-2015, we contribute with new findings on the impact of the Setting up aid (hereafter SUA).[1] We investigate whether the SUA affects, firstly, farmers' transition process of becoming farm manager and, secondly, income from farming, off-farm income and farm survival. We use a Regression Discontinuity Design (RDD) to evaluate the impact of the SUA. The RDD differs from other pre-post group designs by its method to assign individuals to either the treatment or the comparison group. In RDD, assignment is made on the basis of a cut-off score on a treatment assignment variable. Intuitively, if nothing but the probability of receiving treatment changes at the cut-off, any jump in the conditional expectation of the outcome variable at the cut-off can be attributed to the effects of treatment. RDD has been described as the "close cousin" of randomized experiments (Lee and Lemieux, 2010; Dinardo and Lee, 2011).

Because a farmer has to be 40 or younger to be eligible for the SUA, there is a cut-off requirement that we exploit in a RDD to estimate the causal effect of the SUA. This cut-off provides idiosyncratic variation in the probability of receiving the SUA as, arguably, farmers who are just eligible for the setting up aid (age ≤40) are comparable to farmers who just missed the eligible cut-off (age>40). As the validity of the RDD hinges on the existence of a cut-off effect, we precede the results here to show that such a cut-off is indeed present in our data (see Figure 2, which we will return to in more detail later). At the age of the subsidy requirement, there is an evident drop in the probability of taking managerial control of a farm (among persons with a background as *hired*[2] farmers): at age 40 the probability decreases with almost 2 percentage points (or around 10 per cent).

The succession of a farm is related to the incumbent farmer's (often the parent's) retirement decision and the relationship between the incumbent farmer's age and the timing of succession is nonlinear (Glauben, Tietje and Weiss, 2004). A late succession is, therefore, likely determined by both unobserved farm- and farmer characteristics, affecting also the post-

[1]The Young Farmer Payment is included in Pillar I from 2015 but has no observed impact on our results. That is, if we exclude 2015 from the study period the results do not change.

[2]It is reported that prospective successors often work as a hired worker before the farm transition takes place (Errington and Lobley 2002; Uchiyama et al., 2008; Lobley, 2010). As a hired worker the successor may be involved in the management of the farm but the incumbent farmer often fails to involve the successor in the financial management of the farm (Chiswell, 2016).

transition business performance and income from farming. Consequently, the age-40 cut-off effect may be biased if a late transition also captures unobserved factors (see Burton (2006) for a discussion of age as an indicator). However, a correct modelling of the assignment variable in a RDD (in our case, the age of the prospective successor) on both side of the cut-off implies an unbiased cut-off effect (Lee and Lemieux, 2010). So, if age is an important determinant of both farm succession and the post-transition business performance, conditioning on age solves the problem.

This study reveals that the setting up aid has a significant impact on the transition to farm management. It also shows a very large drop in incomes when a hired farmer becomes farm manager. As to our knowledge, the literature has not analyzed the impact of gaining management control of a farm on income from farming for hired workers; consequently, the finding of a large negative impact is new. Though we are not able to explain the fall in income, we document that the SUA subsidy mitigates its fall. Affecting both the timing of the succession and post-succession incomes, the SUA is likely to contribute to a generational renewal of the sector. That is, without the policy the share of young farmers would probably be even lower than it is today. Yet, the finding of a large drop in incomes after the transition (also for SUA receivers) indicates that the current policy only mitigates rather than solves the generational renewal problem.

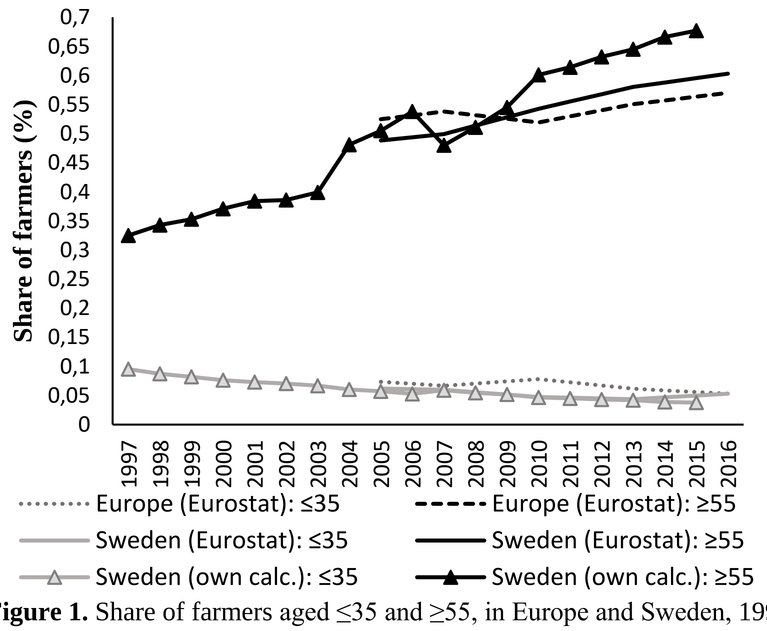

Figure 1. Share of farmers aged ≤35 and ≥55, in Europe and Sweden, 1997-2016.

Figure 2. Probability of taking managerial control of a farm for hired workers, 1998-2015. Shaded lines show 95% coefficient intervals.

2. The generational renewal problem in Sweden and Europe

Figure 1 illustrates how the generational renewal problem have developed over time in Sweden and in Europe as a hole. To follow Eurostat's reporting, i.e., to report the share of farmers (i) younger than 35 and (ii) older than 55, has become standard. However, as the cut-off for receiving the generational renewal subsidies is 40, there is an unfortunate difference between statistics and policy (Zagata and Sutherland, 2015). Eurostat's statistics reports the shares for the period 2005-2016, while our data goes back until 1997. According to Eurostat's statistics, the shortage of young farmers is larger in Sweden than in Europe: the share below 35 is somewhat smaller and the share above 55 is larger than for Europe. The numbers for Sweden based on our data shows a higher share of older farmers than in the Eurostat statistics (mainly in the end of the period), suggesting that the shortage in Sweden might be even larger than previously known. However, this difference may be due to different setups in the two datasets. Eurostat classifies farmers as "sole holder" of an agriculture holding, while there could be more than one holder in our data, contributing to mainly a higher number of older farmers. Moreover, our longer period for Sweden, contributes by showing similar trends before and after 2005. Note also, the kink around 2005, and the relatively high share of old farmers in 2005-2007, is due to the decoupling reform.[3]

[3]In 2004 (when you first applied for decoupled single farm payments) retired individuals with some agricultural land was classified as farmers. However, from 2007, four hectares of land was required for receiving single farm payment, which decreased the number of semi-retired farmers substantially.

3. Data and descriptive analysis

3.1 The data set

The data comes from the Longitudinal Integration Database for Health Insurance and Labour Market Studies (LISA), which includes all individuals 16 years of age and older, registered in Sweden as of December 31 each year. The sample we use is a panel containing everyone who has ever worked in agriculture over the period 1997-2015. For each year, an industry code[4] determines who received farming incomes from work or business. We then merged this data with subsidy data from the Swedish Board of Agriculture for the period 2000-2015.

Next, we restrict the sample to prospective successors. First, we select individuals who has worked as a hired farmer for at least one year during 1997-2015, so that all potential transitions to farm management during the period can be observed, i.e. individuals who start of as managers are not included in the sample. The transition to become a farm manager is identified from information describing if the individual is a manager of a sole proprietorship or a corporation in agriculture. The individual does not necessarily has to be a sole holder and there could be more than one holder/manager of a farm.[5] Second, as the RDD analysis compare people around the cut-off age of 40, we remove individuals far from the cut-off, ≤25 and ≥50, who are less comparable. Individuals younger than 26 may still be investing in (agricultural) education and individuals older than 50 are no longer likely to become managers. Third, the individual is removed from the sample when leaving farming.

We follow individuals over time, both before and after the transition to become manager. The pooled number of farmers across time—both hired workers and farm managers—is 32,183 and the average yearly sample of farmers is 7,384. About 9.7 per cent of the hired workers transit to management every year.

Incomes are collected from tax records and include farmer's individual incomes from work or business. Based on industry codes, we determine (for up to five income sources) if the income is from farming or another sector (off-farm income). Thus, unlike most other studies analyzing *farm* income, we use *individual* gross income (before income tax is deducted but after corporate- and payroll taxes are deducted), and not, e.g., Farm Family Income, which is

[4]The Swedish Standard Industrial Classification (SNI) code, which is identical to the classification of economic activities in the European Community *(NACE)*.

[5]To make sure that the business management is within agriculture and not some other activity we have to restrict the sample to farmers with a main income from farming. This is not a problem because individuals without a main income from farming are very unlikely to become managers and receive the SUA; to be eligible for the SUA a basic requirement is that you are a committed farmer. Thus, even if they may become managers they are not likely to receive the SUA.

measured at the farm/family level (before taxes). Farm survival is defined as having remained as farmer five years after the transition to farm management.

For the descriptive regression analysis in the next section, we add subsidy data measured at the firm level to our individual-level sample. For 38.5 percent of the subsidies, we are not able to identify a receiver; therefore, some receivers are classified as non-receivers[6]. This caveat, is, however, not a problem for our main analysis, because RDD identifies the subsidy effect from the age cut-off at 40 (which we describe in the next section) and not from the subsidy information, per se.

Another potential data drawback is that we cannot explore the transition into agriculture for individuals who enter farming from outside and has not worked as a hired worker before they become managers.[7] However, this group is probably very unlikely to receive the SUA, because it requires (apart from being younger than 41) that the "farmer [...] possesses adequate occupational skills and competence"[8], and if you never worked as a hired worker you probably lack adequate farming skills. Also, we cannot tell from the data if the transition is a succession, but we assume that most transitions are.

3.2 Pre- and post-transition incomes in a descriptive regression analysis

With a descriptive analysis of the economic impact of becoming a farm manager, we pinpoint a potential bias in the comparison of individuals with and without a SUA subsidy; a bias which the RDD methodology aims to solve. We look at the individuals' income from farming longitudinally by regressing income on a set of pre- and post-transition dummies. To remove a positive trend in individual incomes due to increasing farm skills, we control for age and age squared. In addition, we remove a general increase in income from farming with a set of year dummies (see Nordin and Höjgård, 2019). For this analysis, we do not have to know *when* the subsidy is received. Assuming that the SUA is received around the timing of the transition to management is enough. The result of this exercise is shown in Figure 3, separately for subsidy

[6]Also, to determine the timing of the subsidy is somewhat problematic. In the data, the application year is often different from the disbursement year, and neither corresponds with the year the individual transits to a manager position.

[7]However, new entrants who works as hired farmers but who did not grew up on a farm are included. The definition of new entrants is not clear (DGIP, 2017): it could either refer to a successor taking over the family farm or people who begin farming (and who did not grew up on a farm).

[8]European Commission Regulation No. 1305/2014, Article 2 paragraph n.

receivers and non-receivers. We use the first period in time (seven years prior to becoming a manager) as the reference.[9]

The figure shows a significant penalty (i.e., the fall in income between year -1 and 0) of transiting from a hired farmer to a farm manager. The penalty in year zero is smaller for farmers who receive the SUA: around SEK 20,000 and 40,000 (about €2,000 and €4,000) for those with and without SUA, respectively. The penalty is possibly related to transition- and investment costs and postponed income.

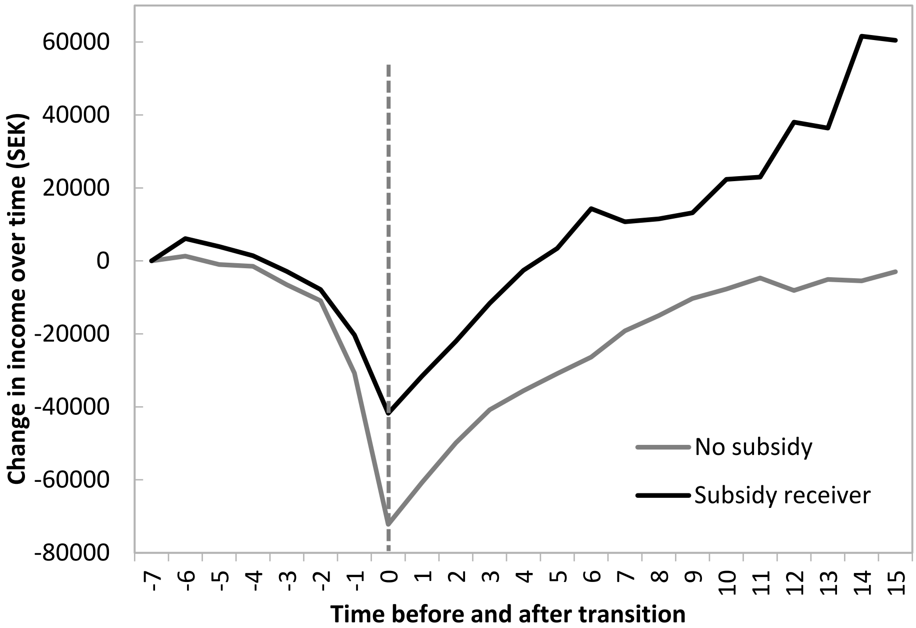

Figure 3. Longitudinal analysis of income from farming before and after getting managerial control of a farm.

Note also that the income falls with SEK 15,000 already the year before the transition. Why this is so is unclear. Partly, it is probably due to certain pre-transition costs, but it could also be due to how the data is reported. In the data, firm management is reported in November and for farmers who become managers late during the year the timing of the transition is mismeasured. Farmers who received the SUA have higher incomes than non-receivers up to 15 years after the transition to farm management.

To sum up, the smaller income penalty in the group who receives the setting up aid indicates an impact. The long-run differences between receivers and non-receivers implies that it is not merely a direct impact of the monetary transfer, but probably also an indirect effect on management, plausibly on investment decisions etc. However, the effect could also be due to

[9]However, as the subsidy receivers are underreported, the income for the non-receivers is biased in the direction of the receivers, i.e. the gap in income between the receivers and the non-receives in Figure 3 is plausibly larger than observed.

selection in the uptake of aid, as indicated by the small difference in income already in the early periods prior to transition. For example, because a solid business plan and an education in agriculture are required for receiving the aid, SUV receivers are likely to differ compared to other farmers transitioning to farm management. In addition, our subsidy data contains a measurement error that might bias the effect. To handle the selection problem and the measurement error in the subsidy data, we use the RDD approach, which by its design aims to estimate a causal subsidy effect.

4. Empirical strategy

4.1 The starting point— an naïve individual fixed effect model

To explain and build the formal representation of the RDD model, we start by presenting a simple *naïve* individual fixed effect model. This model estimates the impact of the transition to farm management, M (i.e., the potential income penalty found in Figure 3), on income from farming, *Y*, in year *t* from:

$$Y_{it} = \alpha_i + \delta_t + \beta_0 M_{it} + \beta_1 SUA_{it} + \gamma X + \epsilon_{it} \qquad (1)$$

where α_i and δ_t are individual- and year fixed effect, respectively. β_0 is the income effect of gaining management control (represented by the indicator variable M, M=1 after transition). γ are the effects of a set of covariates, X, i.e., observable characteristics affecting the outcome and SUA (including age). The subsidy indicator variable, SUA[10], captures the impact, β_1, of the subsidy. According to Figure 3, β_1 is positive due to the smaller drop in income for subsidy receivers than non-receivers. However, selection in uptake is likely and we also have the problem with measurement errors in the subsidy data. Consequently, this model is *not* estimated.

4.2 RDD model of income from farming, off-farm income and farm survival

Figure 2 revealed a clear cut-off effect in the probability of becoming farm manager at age 40. As there is no other known reason explaining the finding of Figure 2, we exploit this cut-off as the age eligibility requirement in the RDD[11]. Because the RDD compares individuals just below the cut-off to those just above, and not SUA receivers to non-receivers, overall selection in SUA

[10]Note that SUA is a subset of M because SUA is conditional on transfer to management.

[11]Later we specify a RDD model for estimating the cut-off effect on the probability of becoming farm manager at age 40. However, as this section has its focus on income from farming we prefer to begin with specifying a RDD model for income from farming.

uptake is no longer the problem. Instead, in an RDD, any manipulation of the cut-off is, but section 4.4 will alleviate this concern.

Formally, in a RDD analysis the assignment variable determines the treatment status. In our case, SUA is the treatment and the assignment variable is age, A. An individual is eligible for the subsidy if A ≤ 40 but, as this is merely an eligibility requirement and not the treatment status, we replace *SUA* in Equation 1 with $M_{it} \times A_{\leq 40}$ in Equation 2:

$$Y_{it} = \alpha_i + \delta_t + \beta_0 M_{it} + \beta_1 M_{ij} \times A_{\leq 40} + f(A) + \gamma X + \epsilon_{it} \qquad (2)$$

Where Y_{it} is either income from farming, off-farm income, or farm survival. $M_{it} \times A_{\leq 40}$ describes that the individual has taken management control and has potentially received a setting up aid. Because treatment status is a stochastic function of age, and not a deterministic one, it qualifies as a fuzzy rather than a sharp RDD. Consequently, β_1 gives the reduced form estimate of the cut-off effect, i.e., a weighted effect for SUA receivers and non-receivers. By weighting β_1 with the share of subsidy receivers[12] in the farm population, we get the true effect. $f(A)$ is a low-order polynomial of A (the assignment variable)[13], modelled separately on both sides of the cut-off. This approach is non-parametric and is often called local linear regression.

It is standard to estimate a RDD model with different bandwidth (i.e., the age intervals before and after the cut-off) and with different polynomials of A. To avoid estimating a treatment effect caused by nonlinearities in A, a small interval (bandwidth) around the cut-off point is recommended (Hahn, Todd, and van der Klaauw, 2001; Lee and Lemieux, 2010). We use the ages 26-50 and 30-45 as bandwidths, and linear and quadratic polynomials.

4.3 Model of the probability of transition

In addition to the different measures of income and farm survival, we study if the age-40 cut-off affects the farmer's probability of becoming manager (i.e., an econometric modelling of Figure 2). The model is an adaptation of Equation 2:

$$M_{it} = \delta_t + \beta_1 A_{\leq 40} + f(A) + \gamma X + \epsilon_{it} \qquad (3)$$

where M is the outcome variable and therefore not interacted with $A_{\leq 40}$.

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[12] Subsidy receivers to population who gain management control before the age of 40.

[13] With a discrete assignment variable a recent study by Kolesár and Rothe (2018) shows that it is not recommended to cluster the standard errors on the assignment variable; robust standards errors is preferred. Their finding is generated from a similar research design as ours where an age 40 treatment effect is estimated on wages.

4.4 Does the RDD assumptions hold?

The RDD assumes that individuals are, conditional on A, randomly distributed as farm managers around A_{40}. If this assumption holds, then the design ensures that those who just barely received the SUA are comparable to those who just barely did not. To assess randomness in assignment around the cut-off, Lee and Lemieux (2010) recommend a histogram of the assignment variable to look for bunching around the cut-off. Such bunching is a strong indication of manipulation of the assignment variable, meaning that individuals have influenced whether or not they made the cut-off to become treated. In our case, it seems plausible to expect bunching if more foresighted farmers consider the SUA eligibility requirement and thereby becomes farm managers earlier, before turning 41. However, Figure 4, a histogram of age when becoming manager, shows no indication of bunching in frequency at age 40.

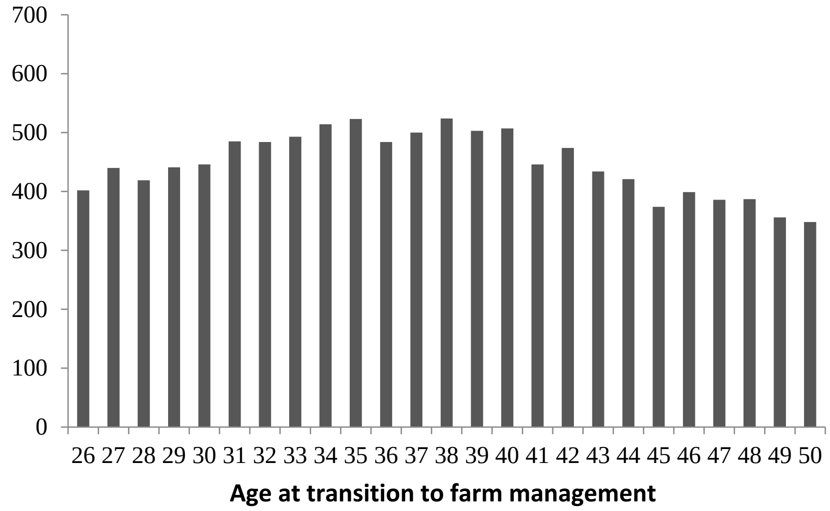

Figure 4. Histogram of age at transitioning to farm management.

A formal test is proposed by McCrary (2008). This test, first, computes the frequencies for each bin (each age) and, second, estimates a regression of the (logarithmic) frequencies on a cut-off indicator variable (when controlling for A[14]). Table 1 reports a small and insignificant McCrary test statistic. Thus, farmers do not appear to speed up the transition to farm management and selection is therefore rejected.

[14]For the tests in this section, we use model 2 in Table 2 with one polynomial of A; which we consider our preferred model.

Table 1. Balancing test of covariates and the McCrary test

	Woman	Years of schooling	Education in farming
$A_{\leq 40}$	0.0015	0.199***	0.0269
	(0.0157)	(0.0675)	(0.0232)
Observations	11,190	11,175	11,190
R-squared	0.011	0.059	0.052
McCrary test (estimate of A=40)		1.391	
		(10.75)	

Note: The dependent variables in the upper panels are farmer characteristics measured at age of transition to farm management. In the McCrary test the dependent variable is frequencies of age at transition to farm management. Linear age polynomials are included separately above and under the cut-off. ***Significant at 1% level. Robust standard errors.

Another test analyze if there is a jump in background factors at the cut-off, i.e., if farmers around the cut-off are different. Table 1 tests for discontinuity around 40 for gender, year of schooling, and farm education. For farm education and gender, there is no discontinuity around 40. For years of schooling, it is more unclear: we find a small but significant cut-off effect of 0.2 (i.e., at the cut-off the difference in schooling is 0.2 years). However, this difference is not problematic as we control for years of schooling,[15] but it may indicate selection on other characteristics as well. Nevertheless, when considering both the McCrary test and the differences in background factors, we conclude that selection around 40 is a minor problem and any potential selection will be removed by the individual fixed effects and the covariates in the RDD model.

5 RDD results

5.1 Probability of transition

Beginning with the probability of transition, Table 2 presents results from Equation 3—the age-40 cut-off effect on farm management. Columns (1) and (2), include a linear age control (modelled separately on either side of the cut-off) and in column (3) we add squared age. In columns (1)-(3) we use the ages 26-50 as our bandwidth and in column (4) we use a smaller bandwidth of 30-45. The cut-off effect is 0.21 percentage points in columns (1)-(2) and (4), showing that hired workers younger than 41 are around 25 percent (calculated at the mean probability of transitioning to farm management) more likely to take management control compared to hired workers older than 40. We find no effect when including quadratic age in column (3). This finding is in line with Figure 2, were age appears to affect the probability

[15]The fixed effects control for between individual differences in education and the years of schooling variable control for individual changes in years of schooling over time.

lineally, and when including quadratic age, we probably remove the effect by introducing to many age controls on a few number of bins. Our impression from Figure 2 and the estimated cut-off effect, is that the eligibility requirement of the SUA, undeniably, affects the probability of farm management. The clear increase in probability before the 40-age cut-off, and the clear decrease in probability after the cut-off, is unlikely to be caused by other factors.

Table 2. Estimating the age 40 cut-off effect on farm management.

	(1)	(2)	(3)	(4)
$A_{\leq 40}$	0.0209***	0.0210***	0.00616	0.0205***
	(0.00271)	(0.00271)	(0.00387)	(0.00344)
Bandwidth	26-50	26-50	26-50	30-45
Polynomials	1	1	2	1
Covariates	no	yes	yes	yes
R-squared	0.040	0.040	0.043	0.039
Observations	132,929	132,929	132,929	84,348
Individuals	32,183	32,183	32,183	22,255

Note: The dependent variable is farm management. Covariates include years of schooling, education in farming and time dummies. ***Significant at 1% level. Robust standard errors.

5.2 Income from farming, off-farm income and farm survival

Next, we estimate Equation 2 for income from farming, off-farm income, and farm survival and Table 3 reports results in accordance with the finding in Figure 3: a negative impact of farm management on income from farming of 0.11 percentage points (columns 1-3). For individuals younger than 41, the effect is counteracted by a cut-off effect of around 0.05, which we interpret as a positive impact of the SUA. Neither a smaller bandwidth, nor an increased number of polynomials, impacts the size of the effect (see columns 2 and 3), but a smaller bandwidth increases the standard errors, turning the effect insignificant. We weight the reduced form estimate in Table 2 with the share of managers with the SUA (about 52% of those who gain management control when younger than 41) to receive the average effect for the treated instead of the average effect of the potentially treated.[16] This estimate is 9.7 (0.05/0.52) percentage points, meaning that the net impact of farm management for subsidy receivers is almost zero (9.7-11).[17]

[16]Like in instrument variable estimation where the IV-estimate is: $\frac{Reduced\ form\ estimate}{First\ stage\ estimate}$.

[17]We cannot visualize the cut-off effect on income from farming, even if it is standard to do so. Without a control for management, M, the cut-off effect captures the net effect of management (which is negative on income from farming) *and* the subsidy effect (which is positive on income from farming).

Table 3. Estimating the age 40 cut-off effect on income from farming, off-farm income and farm survival.

	Income from farming			Off-farm income	Income from farming in year 5	Farm survival in year 5
	(1)	(2)	(3)	(4)	(5)	(6)
M	-0.111***	-0.109***	-0.106***	-0.0730*	0.241***	
	(0.0131)	(0.0132)	(0.0158)	(0.0428)	(0.0165)	
$M*A_{\leq 40}$	0.0500**	0.0532**	0.0473	-0.252***	0.0508	0.0421*
	(0.0247)	(0.0248)	(0.0305)	(0.0775)	(0.0312)	(0.0228)
Bandwidth	26-50	26-50	30-45	26-50	26-50	26-50
Polynomials	1	2	1	1	1	1
Covariates	yes	yes	yes	yes	yes	yes
R-squared	0.087	0.087	0.065	0.013	0.738	0.065
Observations	132,929	132,929	84,348	132,929	103,904	7,757
Individuals	32,183	32,183	22,255	32,183	25,374	7,757

Note: The dependent variables are logarithmic income from farming (1)-(3), logarithmic off-farm income (4), farm survival (5) and logarithmic income from farming five years after transitioning to farm management (6). Farmer fixed effects are included in (1)-(5). Covariates include years of schooling, education in farming and time dummies. ***Significant at 1% level, **Significant at 5% level, *Significant at 10% level. Robust standard errors.

Turning to column (4), we find that management decreases off-farm income, particularly for subsidy receivers. Because off-farm incomes are low on average, small absolute changes implies large relative changes (and farm management often implies an end to an off-farm engagement).

As a next step, we estimate the SUA effect on income from farming five years after transition (column 5) and farm survival (column 6). We use the same specification as in column (1).[18] We find that the cut-off effect on income from farming in year five is similar to the effect in year zero (but insignificant due to larger standard error), while the general impact of farm management has turned positive. Finally, the results, in column (6), show that farmers who receive the SUA have a higher probability of surviving as farmers[19].

5.3 Placebo test

One way of testing the accuracy of the results is to execute a placebo test. For farm management and income from farming, we model the age eligibility cut-off to be 35 and 37 instead of 40. Table 4 reports these placebo cut-off effects. For farm management, we find a small cut-off effect at age 37 (about a fourth of the effect at age 40). But the overall finding from the placebo analysis supports our empirical strategy as the incorrect assignment of individuals to treatment and comparison groups provide insignificant estimates.

[18]The other two specifications provide similar results (not reported).

[19]Because farm survival is conditional on having become manager, the sample is much smaller as non-managers, and the panel dimension, is lost.

Table 4. Estimating placebo cut-off effects when assuming age eligibility cut-offs of 35 or 37.

	Farm management		Income from farming	
	Age≤35	Age≤37	Age≤35	Age≤37
$A_{\leq 35 \text{ or } 37}$	-0.0015	-0.0057**		
	(0.00289)	(0.00289)		
$M*A_{\leq 35 \text{ or } 37}$			0.0184	0.0066
			(0.0245)	(0.0247)
Bandwidth	26-50	26-50	26-50	30-45
Polynomials	1	1	1	1
Covariates	yes	yes	yes	yes
Observations	132,929	132,929	132,929	132,929
R-squared	0.042	0.041	0.086	0.086
Number of Persons	32,183	32,183	32,183	32,183

Note: The dependent variables are farm management and logarithmic income from farming. Farmer fixed effects are included in columns (3)-(4). Covariates include years of schooling, education in farming and time dummies. ***Significant at 1% level, **Significant at 5% level, *Significant at 10% level. Robust standard errors.

6. Conclusions

Our results indicate that the setting up aid contribute to mitigate the generational renewal problem. We find that the age-40 eligibility requirement of the setting up aid has a significant impact on the transition to farm management. A higher probability of transitioning before age 41 is likely to decrease the average age of farm managers.

Moreover, the setting up aid increases incomes from farming in both the short and long run. It also increases the probability of farm survival. The long run impact indicates that the setting up aid affects investments, for example, through returns to investments or through reducing borrowed capital, lowering the interest costs. At the same time, the setting up aid decreases off-farm income, possibly because farm management competes with other engagements.

Whether the setting up aid affects the probability of *becoming* a farm manager for young hired farmers, and not only *becoming manager sooner rather than later*, cannot be empirically analyzed in this setting. Nevertheless, as the setting up aid reduces the transition age and increases income from farming, the aid appears to make farming more attractive for young people. This study, therefore, concludes that the aid is likely to fulfil its aim of attracting young persons into farming.

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